Amphibians and reptiles of the Hashemite Kingdom of Jordan

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Abstract: Jordan has a very diversified morphology, which is reflected also in the diversity of its herpetofauna. A total of 90 amphibian and reptilian species is known to inhabit Jordan. Of those three are amphibians, with the fourth species (*Pelobates sriacus*) most probably already extinct, 47 are lizard species, 35 are snakes species and five turtle species. The amphibians are represented by three different families, lizards and snakes both by seven families and turtles by four families. The distribution, ecology and systematics for most species are given.

Key words: Jordan, reptiles, amphibians, snakes, conservation, ecology.

Introduction

Jordan, with a surface area of about 89.210 km^2 lies at the junction of the Levantine and Arabian regions of the Near East. Generally, from the physiographic angle of view, four main regions are usually recognised: Rift Valley, Mountain ranges, Eastern desert and Marine environment of the Gulf of Aqabah. This gives Jordan a very diversified morphology, reflected also in the diversity of its herpetofauna.

Jordanian territory forms, due to its geographical position, a crossroad of different zoogeographic realms (Afrotropical, Saharo-Sindian, Oriental, Palearctic), which influences the composition of the Jordanian herpetofauna (e.g. ARNOLD 1987, DISI 1996, JOGER 1987, HAAS 1952, WERNER 1987). Distribution of individual types of biogeographical regions in Jordan is, mainly in the west, influenced by the altitude. The complicated mosaic of high mountains, steep slopes and deep wadis leads to the formation of extremely narrow borders between individual ecozones, or to their overlapping, and causes mixing of floral and faunal elements with different biogeographical affinities in individual localities. The exact definition and delimitation of these regions and determination of characteristic species is often impossible and have very limited value for description of herpetofaunal communities. Nevertheless, the main ecological regions or ecozones were repeatedly defined and used under various names in former studies on Jordanian fauna and flora (e.g. AL-EISAWI 1983, DISI 1996, ZOHARY 1973) and the basic delimitation of these regions is therefore given also herein, together with typical elements of herpetofauna.

Mediterranean ecozone – generally confined to the western highlands, typical by highest rainfall in the region. The vegetation used to be dominated mostly by pine forests (*Pinus halepensis*) in higher altitudes and oak forests (evergreen *Quercus calliprinos* and deciduous *Q. ithaburensis*) at lower elevation. Other important trees include e.g. *Juniperus ionicus*, *Cupressus sempervirens*, *Pistacia palaestina*. Unfortunately, the majority of the region was deforested during the long period of human occupation. Grazing of numerous herds of domestic animals leads to forming secondary, heavily disturbed and rather dry steppes. Deforested regions are partly covered by secondary non-forest shrub vegetation, known as garigue. Interestingly, isolated relict ecosystems with faunal and floral elements, which can be confined to this ecozone, are found in the eastern desert in Azraq and also in high elevations and deep valleys of the Ramm Mountains. The majority of species of the herpetofauna in

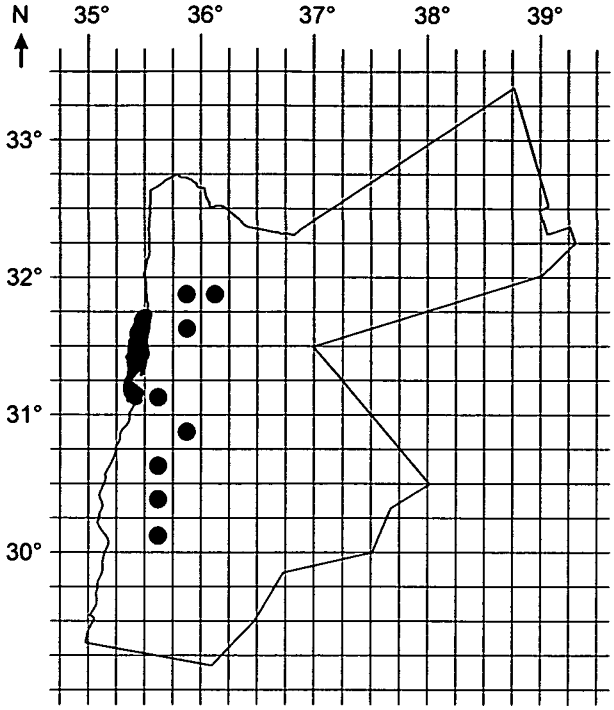

Fig. 1: *Ablepharus rueppellii* is distributed throughout Mediterranean habitats. Southernmost record represents an isolated population in Wadi Ramm, which is probably of relict origin.

the Mediterranean ecozone are of Palearctic origin. Most of the species of amphibians and reptiles inhabiting this ecozone are widely distributed in the eastern Mediterranean region, namely *Rana bedriagae*, *Hyla savignyi*, *Testudo graeca*, *Hemidactylus turcicus*, *Lacerta laevis*, *Typhlops vermicularis*, *Eryx jaculus*, *Malpolon monspessulanus* and several others. However, some of the local reptile species can be considered as Levant endemics, namely *Chalcides guentheri*, *Rhinotyphlops simoni* and *Micrelaps muelleri*. The given distribution of *Ablepharus rueppellii* (Fig. 1) is a typical example of distribution of a Mediterranean faunal element.

Irano-Turanian ecozone, an ecozone defined mainly phytogeographically, forms a strip of mostly steppe habitats surrounding the Mediterranean. It is often considered to be only a transitional zone between drier parts of the Mediterranean and surrounding ecozones. Regardless the poor definition, this ecozone is typical by prevailing steppe habitats with some typical herpetofaunal elements, e.g. *Trapelus ruderatus* and *Acanthodactylus tristrami*. The distribution of latter species (Fig. 2) gives an example of an occurrence of species confined to the Irano-Turanian ecozone.

Saharo-Arabian ecozone – also called the Badyiah, covers the major part of the Jordanian inland. Depending on the geology, geomorphology and latitude and altitude, this region is formed by the various types of arid semidesert and desert habitats. Permanent natural water resources are extremely rare, the most important is the Azraq oasis and Ghadir Burqu'. Various reptile taxa are typical for this ecozone, i. a. *Trapelus pallidus agnetae*, *Acanthodactylus robustus*, *A. grandis*, *Malpolon moilensis*, *Pseudocerastes persicus* and numerous others. Fig. 3 shows a distribution of *Pseudocerastes persicus*, as a typical example of species distributed within this ecozone.

Afrotropical (or Sudanian) ecozone – often called the Afrotropical penetration, extends from Al Karama region in the north through the Rift Valley to Aqabah and also to the east, including the sea shore. This zone is typical by the presence of various African elements and by extensive penetration of Arabian herpetofaunal elements. *Phrynocephalus arabicus*, *Coluber elegantissimus*, *Atractaspis engaddensis* and some other reptile species are typically confined to this ecozone. In contrast, another scincid lizard, *Scincus scincus meccensis* (Fig. 4) is an Arabian faunal element that penetrates the territory of Jordan from sand deserts of Saudi Arabia.

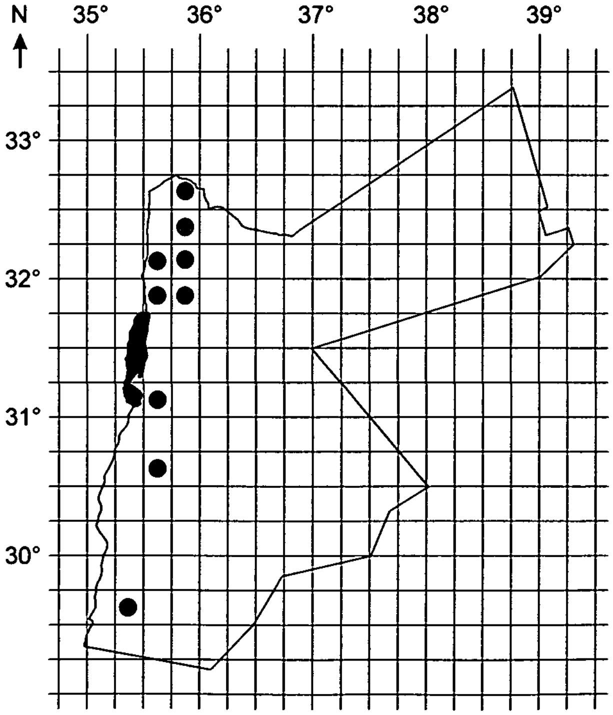

Fig. 2: Distribution of *Acanthodactylus tristrami* showing a pattern typical for species confined to the Irano-Turanian ecozone.

In past two decades, Jordanian herpetology underwent remarkable progress, resulting in dozens of publications in widely respected herpetological journals, for an overview of history of Jordanian herpetology and a comprehensive summary of the current knowledge about the distribution, taxonomy and biology of amphibian and reptilian species see DISI et al. (2001).

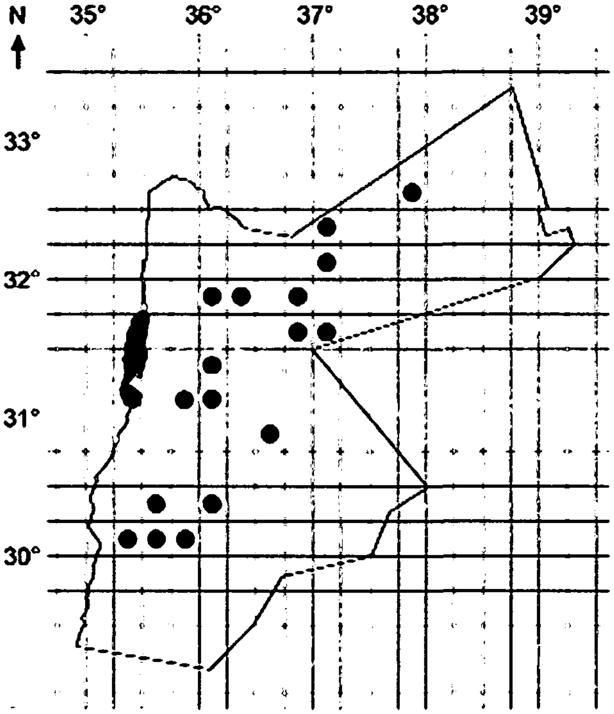

Fig. 3: *Pseudocerastes persicus fieldi* is an example of a species, widely distributed in dry arid and semiarid habitats. Typically, it is parapatrical with *Cerastes gasperettii*.

Amphibians of Jordan

The amphibians represent a group of vertebrates depending on water and surrounding habitats, at least during the breeding season and larval development. Mainly in arid regions, the availability of suitable water bodies represents the main limiting factor of amphibian distribution. Relatively humid regions of NW Jordanian highlands represent the centre of amphibian diversity in Jordan. Unfortunately, this region is, logically, also widely influenced by urbanisation, agriculture and industry. The distribution of some amphibian species, namely *Pelobates syriacus* and *Triturus vittatus* is limited only to this region and the current occurrence of these species is questionable. *P. syriacus* has not been reported since 1973 and the occurrence of *T. vittatus* needs confirmation as well. The remaining three amphibian species are representatives of three amphibian families, basic data on their distribution and ecology follow.

Bufonidae

Bufo viridis LAURENTI 1768 (Fig. 5)

In Jordan, *B. viridis* is the most widespread amphibian species, inhabiting all suitable habitats. It is limited only by the availability of breeding sites. As it is a pioneering species, it quickly colonises temporary water bodies, mostly in anthropogenous habitats also extending its distribution into desert areas. Thus, it is difficult to determine what the localities of original distribution are and where the species occurs secondarily due to previous human activities. Logically, it is distributed mainly in the Mediterranean ecozone. However, some populations living deep in the Eastern desert can be considered as relict, namely those in Azraq, Qa' al Buqay'awiyah and Qasr Burqu'. Many Jordanian populations are threatened by regulation and/or destruction of suitable breeding sites. On the other hand, intense irrigation enables quick colonisation of new habitats in arid regions.

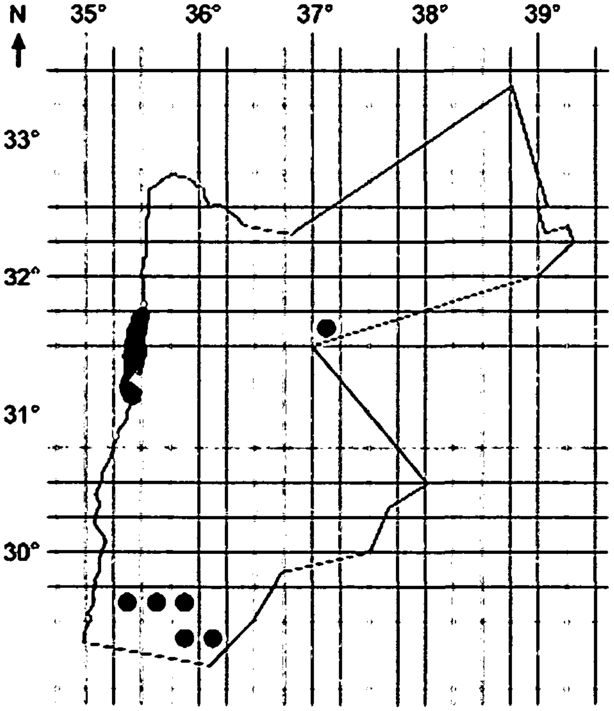

Fig. 4: Distribution of *Scincus scincus meccensis*. This species can be considered as typically psammophilous with distribution copying the distribution of sand dunes east of Wadi al Arabah.

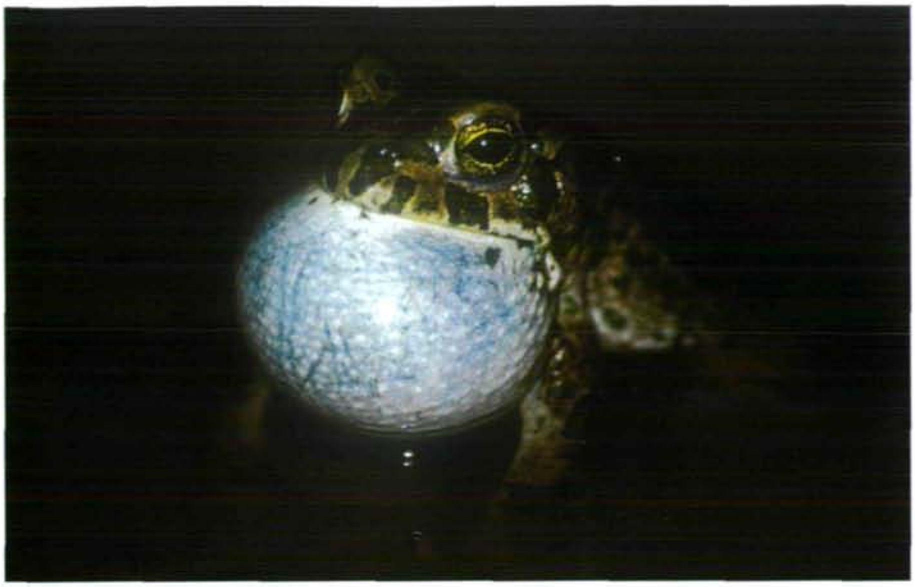

Fig. 5: Green toad, *Bufo viridis* is the only amphibian able to survive harsh condition of Jordanian Eastern Desert. Although the breeding season peaks in early spring months, vocalising males can be observed in water bodies even in the summer. Al Jawa, June 2004 (Photo: D. MODRÝ).

Hylidae

Hyla savignyi AUDOUIN 1812

In Jordan, *H. savignyi* occurs in the western, more humid parts of the country, being reported from several localities. Typically, it inhabits close vicinity of permanent water bodies (both stagnant and running) with rich littoral vegetation. Breeding season of this species starts in mid December and lasts to mid January, depending on rainfall, males can be heard calling until August. Although occurring in high numbers in suitable habitats, *H. savignyi* is locally endangered by water pollution and anthropogenous changes of habitats.

Fig. 6: Sand dunes in Wisad, Eastern Desert (Photo: D. MODRÝ).

Ranidae

Rana bedriagae CAMERANO 1882

For a long time this species was suggested to belong to the widely distributed *Rana ridibunda* PALLAS 1771. Recently, SCHNEIDER & SINSCH (1999) and SINSCH & SCHNEIDER (1999) proved that populations of *Rana* cf. *ridibunda* in the Near East are conspecific with a form described by CAMERANO (1882) as *Rana esculenta* var. *bedriagae*. In Jordan, *Rana bedriagae* inhabits suitable habitats in close vicinity of permanent running and standing water sources, both natural and man made. It is able to survive even in localities with heavy organic pollution and in tributary canals originating from hot mineral springs. Logically, it is common within the western, more humid parts of the country and scattered or absent in semidesert and desert regions; an isolated population, which is probably of relict origin, is known from the Azraq Oasis.

Reptiles of Jordan

Thanks to the above-mentioned overlap of biogeographical realms, the Jordanian territory hosts a surprisingly rich reptile fauna. So far, more then 90 species are known to occur in Jordan (DISI et al. 2001). Interestingly, the occurrence of several reptilian species was proved only very recently (i. e. MODRÝ et al. 1999, RIFAI et al. 2003). Among the most recent additions is the presence of *Phrynocephalus maculatus* in the vicinity of Abar al Hazim and the discovery of a new form of *Lacerta kulzeri* in Wadi Ramm should be noted (publications in prep.). Thus, it is still probable that the list of Jordanian reptiles, as given below, is incomplete, awaiting further additions. Regardless, completeness or incompleteness of the list of Jordanian species, it is evident, that our knowledge about the distribution and biology of several species is only anecdotal, requiring further intense field research. To give a complete commented checklist of all Jordanian reptiles is beyond the frame of the present paper. Moreover, Jordanian herpetofauna was comprehensively reviewed in a recent monograph by DISI et al. (2001). Thus, individual families and/or genera will be listed below, with some notes on particular species or recent discoveries only.

Gekkonidae

Members of the Gekkonidae inhabit virtually all types of habitats in Jordan and in many places represent the most common or, better, most easily observable reptilian species. Generally, the genera represented in the Jordanian herpetofauna only by a single species (like *Hemidactylus*, *Pristurus*, *Bunopus*) usually do not represent a taxonomical problem and their distribution in Jordan is more or less well understood (see DISI et al. 2001).

In contrast, several questions remain among more diverse genera like *Stenodactylus* and *Ptyodactylus*. Being associated with various types of soil, species of terrestrial *Stenodactylus* represent a typical example of ecological vicariance. The species typical for sand dunes (Fig. 6) is the large *Stenodactylus doriae*, which is replaced by a congener (*S. sthenodactylus* in Wadi al Arabah, *S. slevini* in the more eastern localities) in places with harder substrates. *S. grandiceps* is a species widely distributed in harder substrates in the Eastern desert.

Within the genus *Ptyodactylus*, *P. hasselquistii* is the southern, well distinguishable species, while two other species of this genus overlap in mountains and wadis of the western mountain ranges. In some cases, the proper determination might represent a real problem, caused probably also by the phenomenon of hybridisation, as described in Israel (WERNER & SIVAN 1996). In any case, the taxonomy, population genetics and biology of these rock dwelling geckoes require further studies. Within the genus *Cyrtopodion*, *C. kotschyi* was discovered in Jordan only very recently. So far, it is known from two localities within the Mediterranean ecozone, but its distribution is probably wider. It seems that *C. kotschyi* is, in Jordan, associated with original forests and its current distribution might be influenced by extensive deforestation.

Species in Jordan:

Bunopus tuberculatus BLANFORD 1874
Cyrtopodion scabrum (HEYDEN 1827)

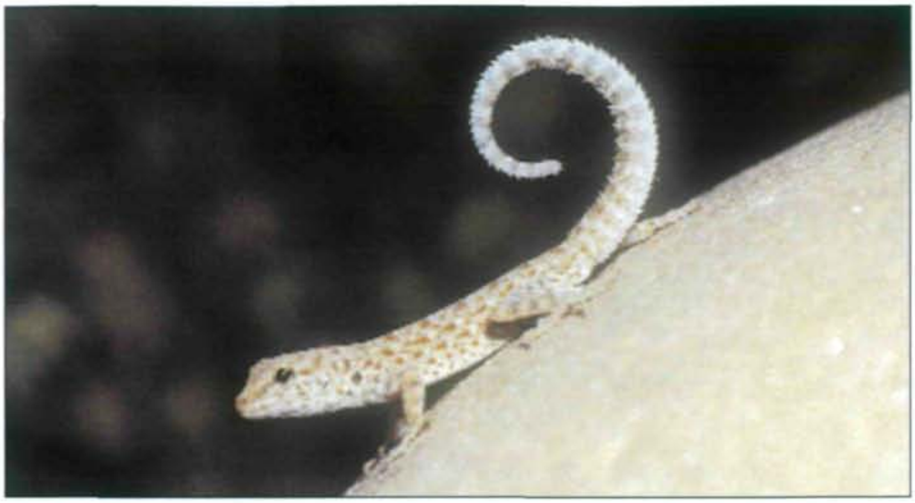

Fig. 7: *Pristurus rupestris* belongs to smallest Jordanian reptiles. This little tiny diurnal gecko inhabits rocky outcrops in the Wadi Ramm region. It is a social lizard, using the tail curling for optical communication. Wadi Ramm (Photo: D. MODRÝ).

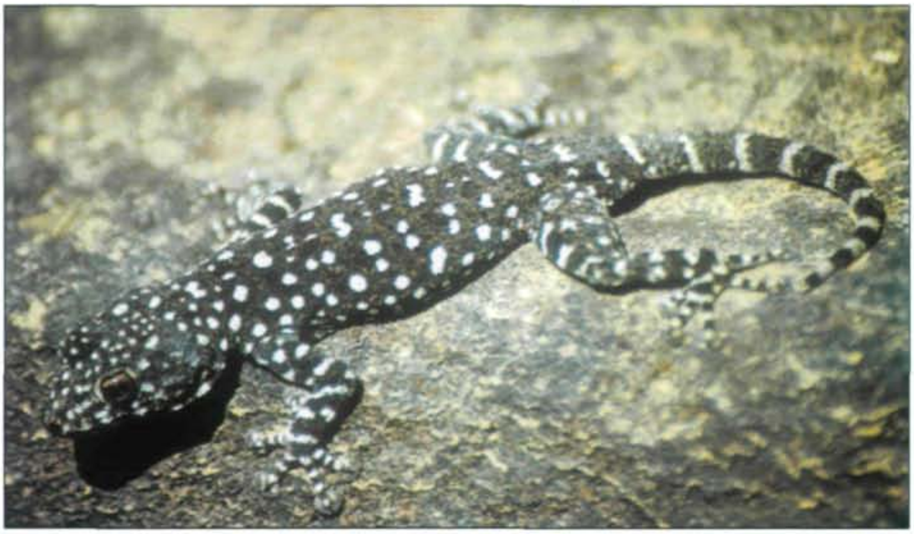

Fig. 8: Males of *Ptyodactylus puiseuxi* are always contrastingly coloured. This gekkonid species inhabits Mediterranean habitats of NW Jordan, but penetrates deeply into the Eastern Desert, reaching the N Saudi Arabia. Al Jawa (Photo: D. MODRÝ).

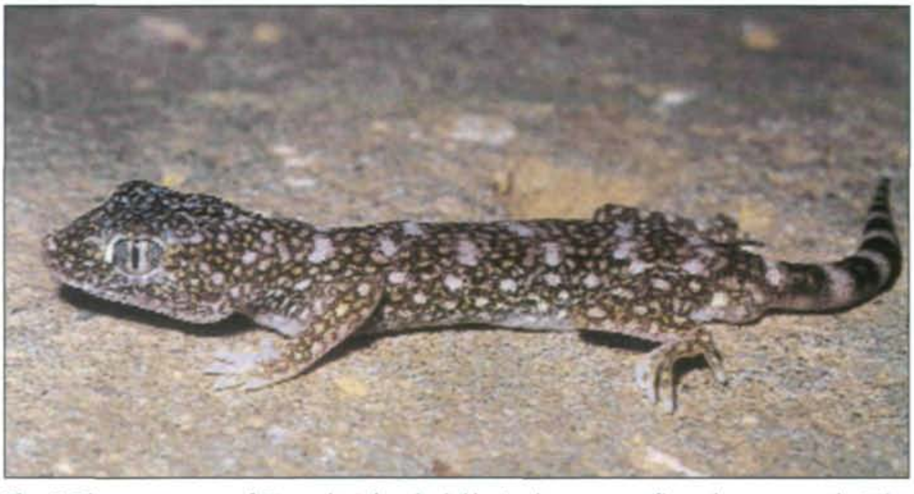

Fig. 9: The occurrence of *Stenodactylus slevini* in Jordan was confirmed very recently. It is known from few localities in Jordanian deserts, usually close to the Saudi Arabian border. It inhabits harder soil and represents thus an ecological vicariant to larger *S. slevini*, which prefers sandy substrates (Photo: D. MODRÝ).

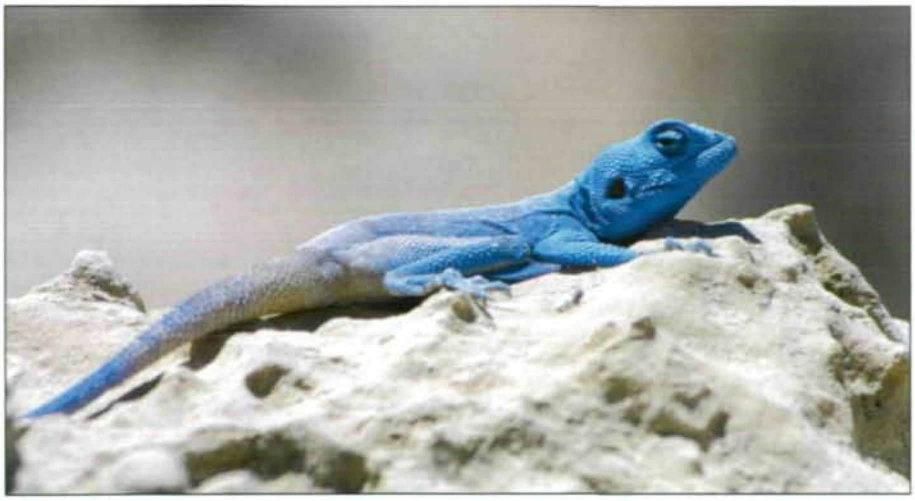

Fig. 10: Displaying males of *Pseudotrapelus sinaitus* are brightly blue. Depicted male from Dana belong to nominotypic subspecies, animals from Eastern Desert were recently described as ssp. *werneri* (Photo: L. Rifai).

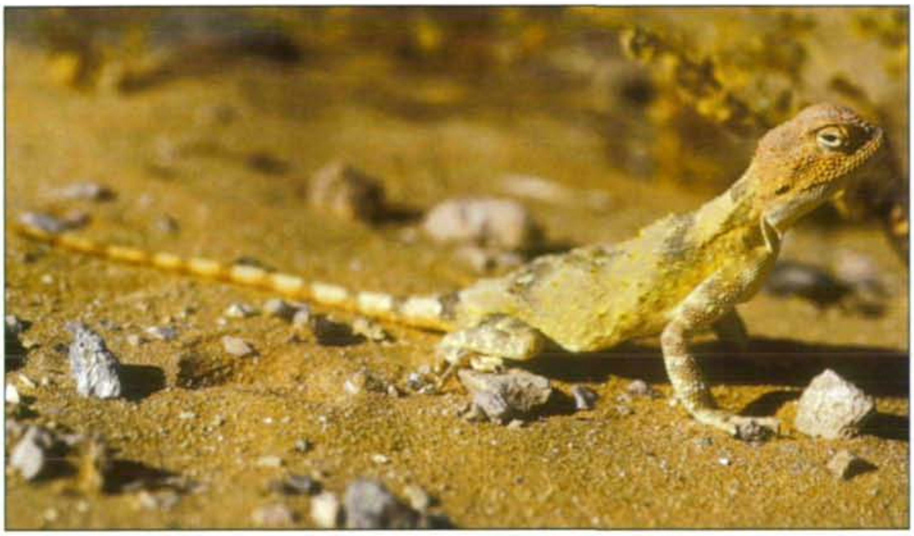

Fig. 11: *Trapelus pallidus agnetae* is an agamid species widely distributed in arid plains of the interior of Jordan. Depicted animal, photographed near Wisad in Eastern Desert, is a female in nuptial coloration (Photo: D. Modrý).

Cyrtopodion kotschyi (Steindachner 1870)
Hemidactylus turcicus (Linnaeus 1758)
Pristurus rupestris Blanford 1874 (Fig. 7)
Ptyodactylus guttatus Heyden 1827
Ptyodactylus hasselquistii (Donndorff 1798)
Ptyodactylus puiseuxi Boutan 1893 (Fig. 8)
Stenodactylus doriae (Blanford 1874)
Stenodactylus grandiceps Haas 1952
Stenodactylus slevini Haas 1957 (Fig. 9)
Stenodactylus sthenodactylus (Lichtenstein 1823)
Tropiocolotes nattereri Steindachner 1901

Agamidae

Most of the Jordanian agamids are desert dwelling species inhabiting the arid interior of the country. Widely distributed *L. stellio* is a polytypic species distributed in Mediterranean and Irano-Turanian habitats (nominotypic subspecies), in the basalt desert (ssp. *picea*) as well as in southern mountain ranges (ssp. *brachydactyla*). The infraspecific variability and taxonomy needs thorough revision, as there are many populations intermediate between particular subspecies.

Within the genus *Trapelus*, three well distinguishable taxa occur in Jordan. *T. ruderatus* is typically associated with Irano-Turanian steppes, while *T. pallidus* inhabits dry, firm soil habitats in the Eastern desert (ssp. *agnetae*) and Wadi al Arabah (nominotypic subspecies). *T. persicus*, which is a bush dwelling species, is confined to densely vegetated wadis and oases in the Eastern desert, being typically associated with *Nitraria retusa* bushes.

Two species of *Phrynocephalus* penetrate the Jordanian territory from Saudi Arabia. *P. arabicus* occurs in sandy habitats of the extreme south of Jordan (Wadi Ramm, Al Mudawarah), *P. maculatus* was recently found in the vicinity of Abar al Hazim. The dabb, *Uromastyx aegyptia* can be found anywhere within deserts of Jordan. However, the populations tend to be scattered and only locally common.

Species in Jordan:

Laudakia stellio (Linnaeus 1758)
Phrynocephalus arabicus Anderson 1894
Pseudotrapelus sinaitus (Heyden 1827) (Fig. 10)
Trapelus pallidus (Reuss 1834) (Fig. 11)
Trapelus persicus (Blanford 1881) (Fig. 12)
Trapelus ruderatus (Olivier 1804)
Uromastyx aegyptia (Forskål 1775)

Chamaeleonidae

Chamaeleo chamaeleon (Linnaeus 1758)

In Jordan, this arboreal species inhabits the western, generally more vegetated regions, omitting only the most arid sandy desert regions. It was collected from Amman, Al Ayna, Al Jubayhah, Ash Shawbak, At Tafilah, Ibbin, Jarash, Ma'an, Petra, Sahab; isolated populations in Azraq and Wadi Ramm are probably of relict origin.

Anguidae

Pseudopus apodus (PALLAS 1775)

This typically Mediterranean species is found in the northern Mediterranean region of Jordan, it was reported from Al'al, Aqraba, As Salt, Dayr Abu Sa'id, Irbid. It prefers light woodlands, with dry and warm hillsides; often found near stream banks; occasionally also close to agricultural fields. The exact distribution and current status of this species in Jordan needs revision. Its populations are scattered and probably threatened by expanding human activities in NW Jordan.

Lacertidae

Lacertids are an even more diversified family than the Gekkonidae. Similarly to other saurian families, lacertids are clearly divided into Mediterranean taxa (represented by the genus *Lacerta*) and the genera inhabiting arid and semiarid habitats (*Mesalina* and *Acanthodactylus*). *Ophisops elegans* on the other hand represents an exception, being distributed in the humid habitats of the Mediterranean ecozone, as well as in the arid habitats of the Eastern desert.

At least two lacertid taxa are noteworthy from the conservational point of view: *Lacerta media*, a large species associated with relatively humid, oak dominated forests, is significantly declining in Mediterranean regions of Jordan due to habitat destruction and continuing deforestation. The second, possibly threatened form is a so far undescribed subspecies of *L. kulzeri*, which is currently known only from one single canyon in the Ramm mountains. This species probably represents a relict form, isolated from the remaining population of *L. kulzeri* (ssp. *petraea*) by extensive area of desert and semidesert habitats.

The most diverse genus among lacertids is *Acanthodactylus*. Typically, up to three species live syntopically in some places, providing a nice example of niche partitioning (RIFAI et al. 2003). The occurrence of *Acanthodactylus hardyi* was confirmed just recently and a species status was given to this former subspecies of *A. scutellatus* (HARRIS & ARNOLD 2001, RIFAI et al. 2003). The questionable occurrence of *A. pardalis* in Jordan needs confirmation. This taxon is reported from Jordan based on a single specimen from the area south of Amman and was never recorded again, despite relatively intense search. It is well possible, that this form is on the margin of extinction or already extinct, due to severe anthropogenous changes of habitats in the region. It is probable, that this taxon actually represents a separate species. If it is already extinct, it is a sad example of a species, which is gone before its formal description.

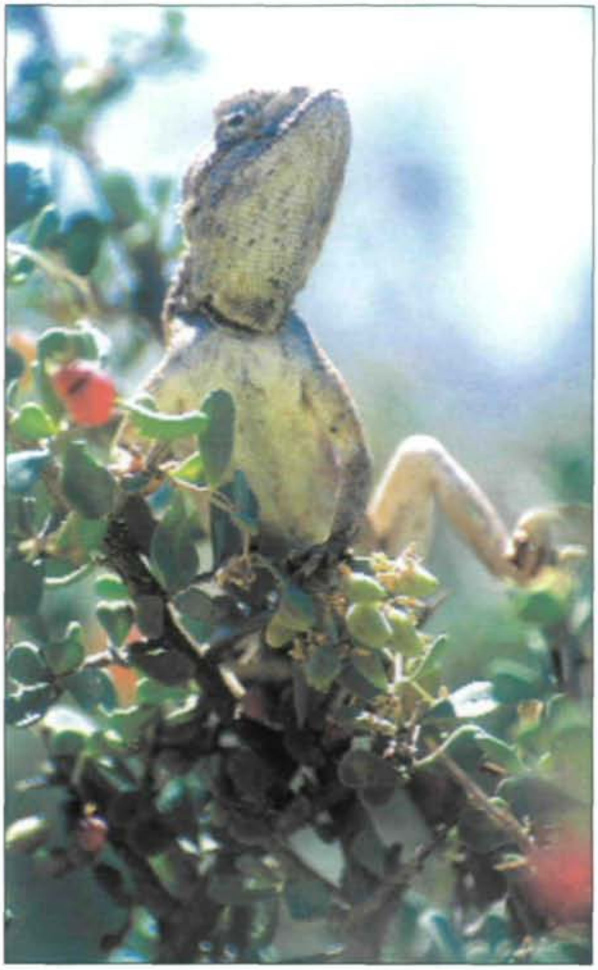

Fig. 12: *Trapelus persicus fieldi* is a large desert agamid always associated with dense larger bushes, typically with *Nitraria retusa*. Thanks to this special ecological requirement, it is known only from few localities in Eastern Desert. Depicted animal is a female, perching on the top of *N. retusa* in Abar al Hazim (Photo: D. MODRÝ).

Species in Jordan:

Acanthodactylus boskianus (DAUDIN 1802)
Acanthodactylus grandis BOULENGER 1909
Acanthodactylus hardyi HAAS 1957
Acanthodactylus opheodurus ARNOLD 1980
Acanthodactylus pardalis (LICHTENSTEIN 1823)
Acanthodactylus robustus F. WERNER 1929
Acanthodactylus schmidti HAAS 1957
Acanthodactylus tilburyi ARNOLD 1986
Acanthodactylus tristrami (GÜNTHER 1864)
Lacerta kulzeri MÜLLER & WETTSTEIN 1932

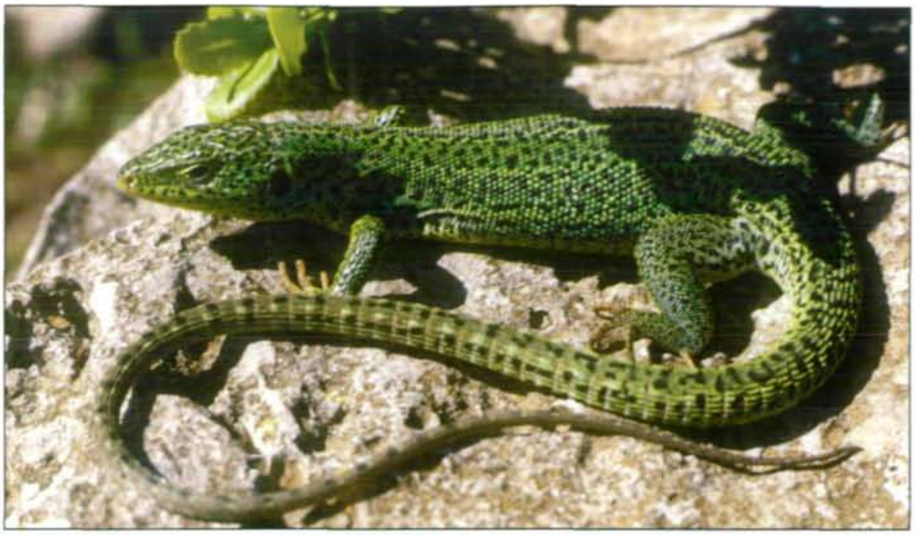

Fig. 13: *Lacerta media* is the largest Jordanian lacertid that can not be misidentified. It occurs in Mediterranean oak and mixed forests and is seriously endangered by continuous deforestation of NW Jordan (Photo: D. MODRÝ).

Lacerta laevis GRAY 1838
Lacerta media LANTZ & CYRÉN 1920 (Fig. 13)
Mesalina brevirostris BLANFORD 1874
Mesalina guttulata (LICHTENSTEIN 1823)
Mesalina olivieri (AUDOUIN 1829)
Ophisops elegans MÉNÉTRIÉS 1832 (Fig. 14)

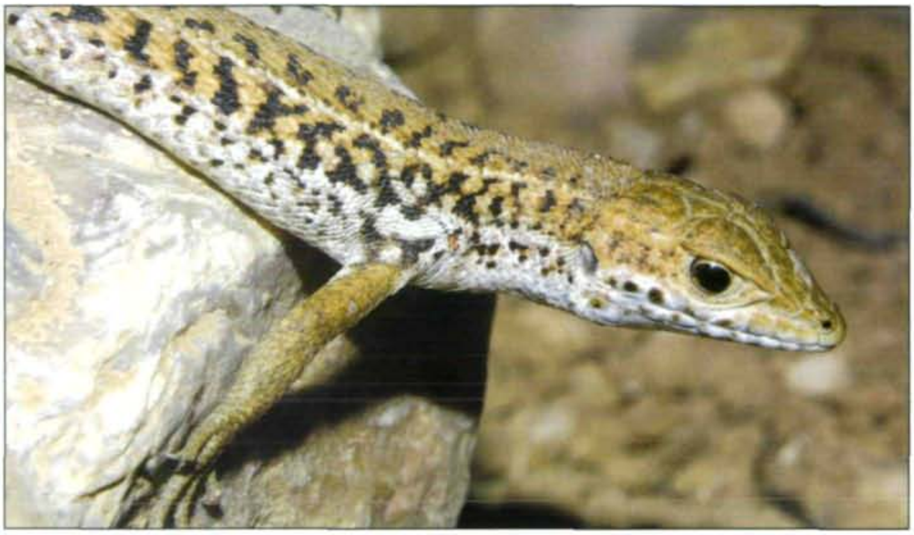

Fig. 14: *Ophisops elegans* is ecologically plastic lacertid species, widely distributed from Mediterranean humid habitats to true desert. Photographed male is from Ramtha (Photo: L. RIFAI).

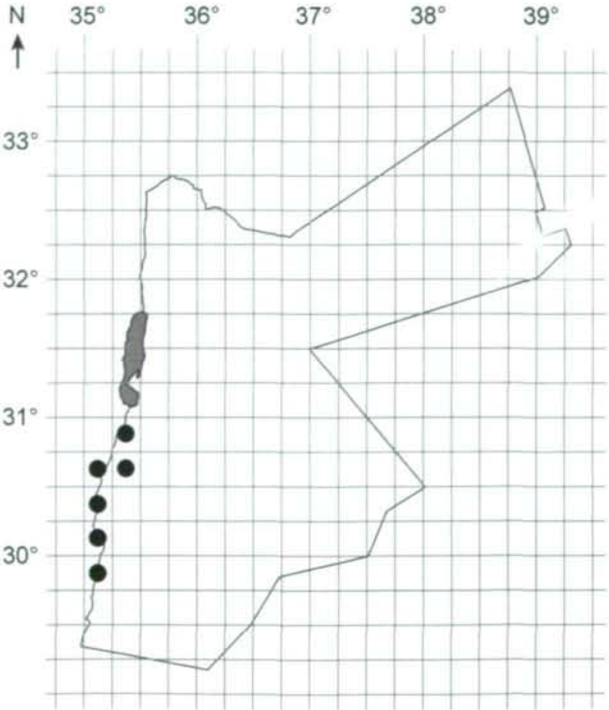

Fig. 15: *Sphenops sepsoides* is a typical African element, penetrating to the sand dunes of Wadi al Arabah only. As it is strictly psammophilous, the mountain ranges emarginating the rift valley from the east represent a barrier preventing the distribution of this species eastward.

Scincidae

The family Scincidae is represented by eight species in Jordan, belonging to seven genera with rather different biogeographical affinities and patterns of distribution. Two of these species, namely *Chalcides guentheri* and *Ophiomorus latastii* are endemic to the Levant region, both living very secretively and being only rarely encountered in the field. *Sphenops sepsoides* is an African element in the Jordanian herpetofauna, it has also rather restricted distribution, as it penetrates the Jordanian territory only in sand dunes of Wadi al Arabah (Fig. 15). In contrast, *Scincus scincus meccensis* is a typical Arabian taxon, distributed in the dunes of southern and south-eastern Jordan. This taxon was originally described as a separate species, later referred to as a subspecies of the North African *Scincus scincus*. However, its pattern of distribution and strikingly different coloration warrants a separate species status.

Ablepharus rueppellii (for taxonomic revision see SCHMIDTLER 1997) and *Mabuya vittata* are mostly Mediterranean species associated with humid habitats. However, an isolated relict population of *A. rueppellii* occurs in the Ramm mountains (SINDACO et al. 1995) and latter species forms an isolated, probably also relict population in the Azraq oasis. *Eumeces schneiderii* is an ecologically plastic species, occurring typically within Mediterranean and Irano-Turanian ecozones, but penetrating deeply into the Eastern desert.

Species in Jordan:

Ablepharus rueppellii (GRAY 1839)
Chalcides guentheri BOULENGER 1887
Chalcides ocellatus (FORSKÅL 1775)

Eumeces schneiderii (Daudin 1802)
Mabuya vittata (Olivier 1804)
Ophiomorus latastii Boulenger 1887
Scincus (scincus) meccensis Wiegmann 1837
Sphenops sepsoides (Audouin 1829)

Varanidae

Varanus griseus (Daudin 1803) (Fig. 16)

A Saharo-Arabian species, which is widely distributed in the desert habitats, reaches the middle of the Jordan Valley. In Jordan, the "waral" inhabits desert regions with both sandy and hard substrates, dry wadis, foots and slopes of rocky hills not avoiding such extreme habitats as wind blown dunes and the basalt desert. *V. griseus* is often wrongly considered to be venomous. A monitor's bite cannot cause any significant health problems except of local tissue damage and consequent secondary bacterial infection.

Typhlopidae

This family is represented by two species of fossorial snakes in Jordan, both being confined to the Mediterranean ecozone.

Species in Jordan:

Rhinotyphlops simoni (Boettger 1879)
Typhlops vermicularis Merrem 1820

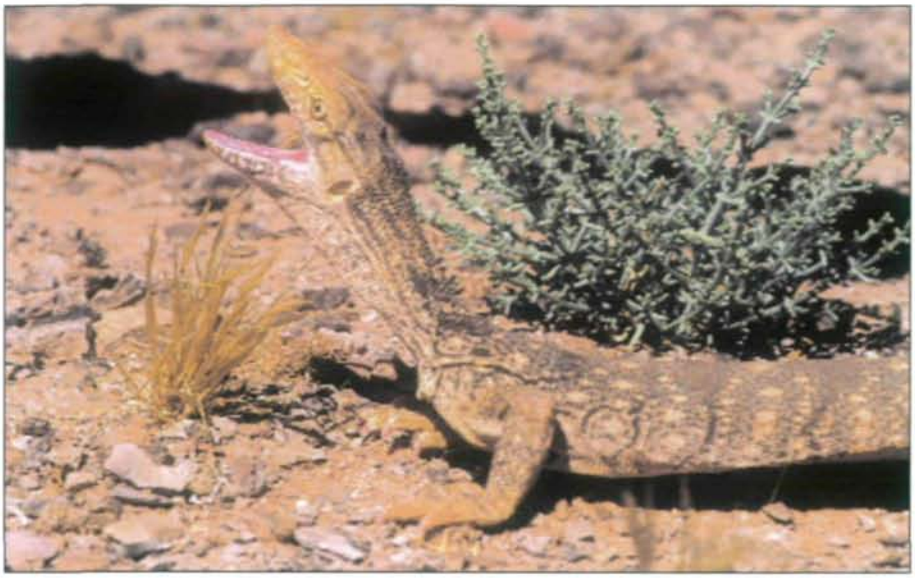

Fig. 16: *Varanus griseus* is the largest Jordanian lizard, widely distributed in desert habitats throughout the territory. Qa al Bqueiah (Photo: D. Modrý).

Leptotyphlopidae

Leptotyphlops macrorhynchus (Jan 1861) (Fig. 17)

In Jordan, this fossorial snake is found mainly within the Irano-Turanian and Mediterranean ecozones, but evidently penetrates into the true desert. Though relatively sparsely collected, it is probably widespread.

Boidae

Eryx jaculus (Linnaeus 1758) (Fig. 18)

In Jordan, *E. jaculus* has been reported from habitats of the Mediterranean and Ira-

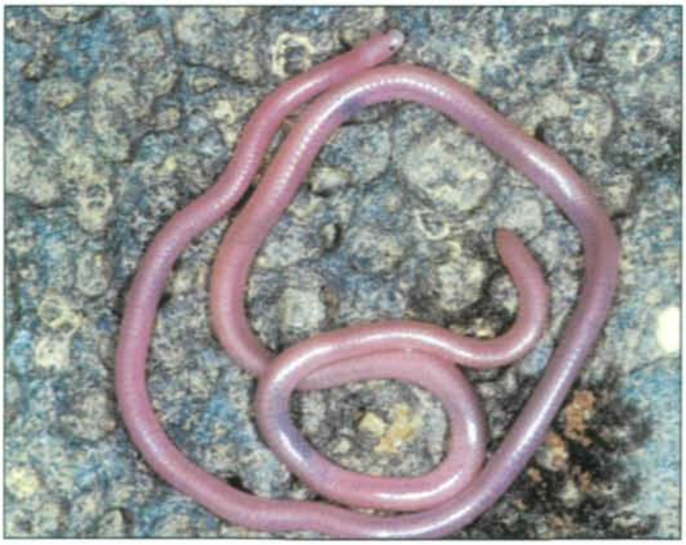

Fig. 17: *Leptotyphlops macrorhynchus* is a little fossorial snake species, that is probably widely distributed in Jordan. Thanks to its secretive life style, it is only rarely collected. Specimen from Wadi Ramm (Photo: D. Modrý).

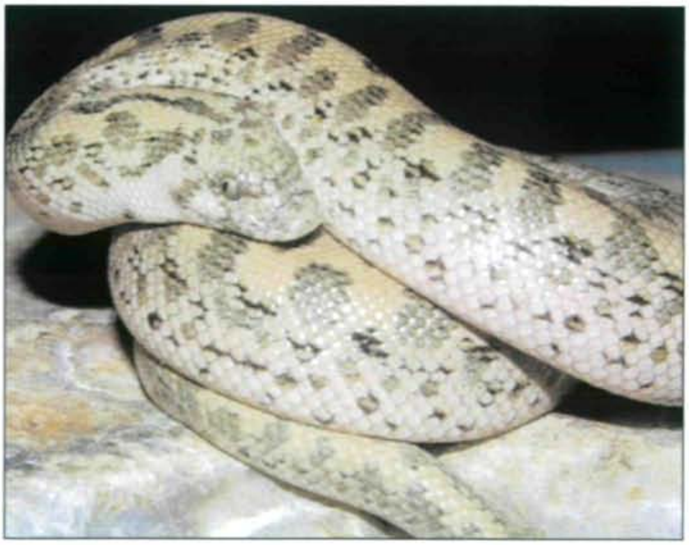

Fig. 18: *Eryx jaculus* is the only boid snake in the region. In Jordan, it is distributed mainly in humid and mesic habitats of eastern part of country. However, in Safawi region this species penetrates deeply into the lava desert. Irbid (Photo: L. Rifai).

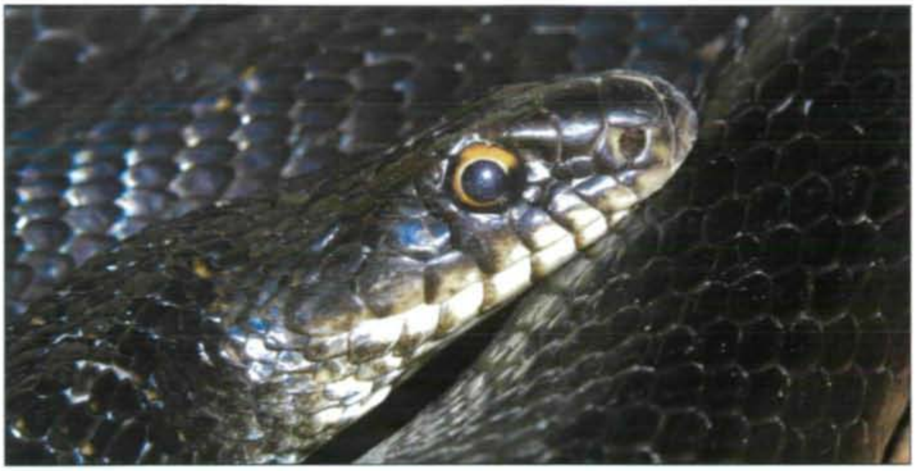

Fig. 19: Head of *Coluber jugularis*. Jordanian populations belong to ssp. *asianus*, which is typically completely black coloration of adult animals. In contrast, juveniles are patterned. It is the largest Jordanin colubrid, reaching the lenght of more than 2 m. Specimen from Ramtha region (Photo: L. RIFAI).

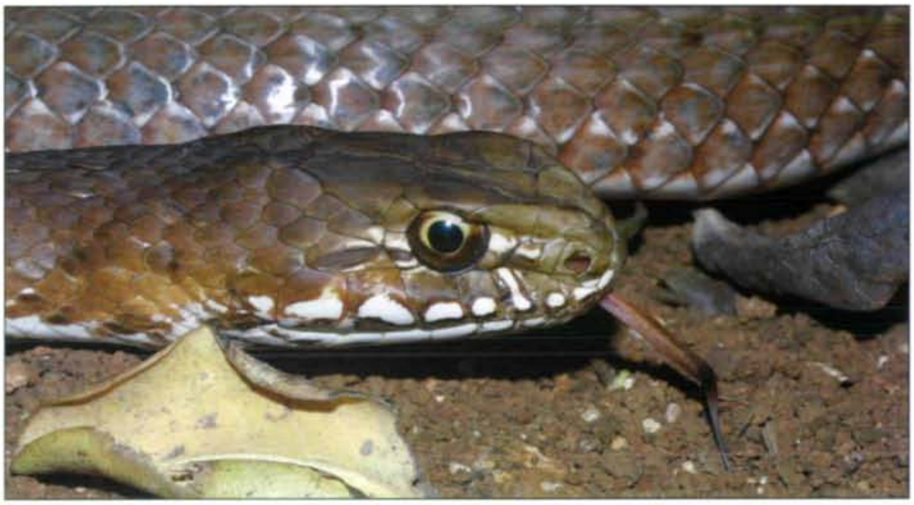

Fig. 20: *Malpolon mospessulanus* is a large colubrid from Mediterranean ecozone. Although it has opistoglyph dentition, cases of mild envenomation are occasionally reported after the bite by large specimens. Depicted animal is from the Ajloun area (Photo: L. RIFAI).

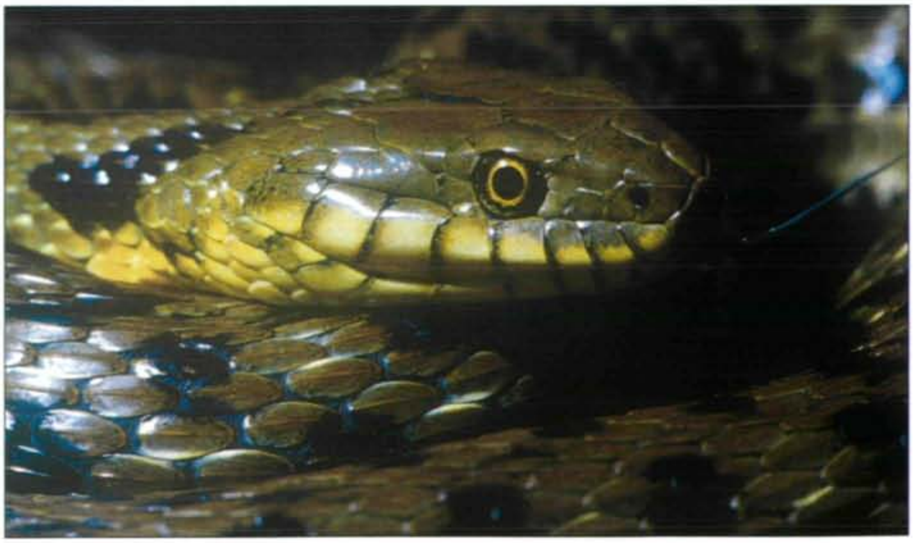

Fig. 21: *Natrix tessellata* is the only water snake in Jordan. It inhabits more humid western part of the country. Relict population occurs in Azraq oasis (Photo: D. MODRÝ).

no-Turanian ecozones. Although it typically inhabits dry steppes and light Mediterranean forests; in Safawi it penetrates also into the black lava desert.

Colubridae

Similarly to other reptiles, also colubrid snakes can be divided into several groups based on their ecological requirements. The species richest is the assemblage of snakes inhabiting the Mediterranean habitats in the western part of the country. This group includes *Coluber jugularis*, *C. nummifer*, *C. rubriceps*, *Eirenis decemlineata*, *E. lineomaculata*, *E. rothi*, *Malpolon monspessulanus*, *Natrix tessellata* and *Telescopus nigriceps*.

Then, several other, usually widely distributed species are confined to semiarid and arid habitats of Irano-Turanian and Saharo-Arabian ecozones, namely *Coluber rhodorachis*, *C. rogersi*, *Eirenis coronella*, *Lytorhynchus diadema*, *Malpolon moilensis*, *Psammophis schokari*, *Rhynchocalamus melanocephalus*, *Spalerosophis diadema* and *Telescopus dhara*. *Coluber elegantissimus* and *C. sinai* are rare species penetrating the Jordanian territory from the south.

Recently, the occurrences of *Coluber schmidti* and *C. ravergieri* were confirmed in northernmost areas of Jordan, in the southern foothill of Jabal al Arab Mts., extending to Jordan from Syria. Similarly, the occurrence of *Telescopus hoogstrali* was recently recorded in the Petra and Dana regions. Generally, the distribution of several snake species in Jordan is only poorly known, requiring further intense field research.

Species in Jordan:

Coluber elegantissimus (GÜNTHER 1878)
Coluber jugularis LINNAEUS 1758 (Fig. 19)
Coluber nummifer REUSS 1834
Coluber ravergieri MENTRIES 1832
Coluber rhodorachis (JAN 1865)
Coluber rogersi (ANDERSON 1893)
Coluber rubriceps (WENZMER 1919)
Coluber schmidti (NIKOLSKI 1909)
Coluber sinai (SCHMIDT & MARX 1956)
Eirenis coronella (SCHLEGEL 1837)
Eirenis decemlineata (DUMÉRIL, BIBRON & DUMÉRIL 1854)
Eirenis lineomaculata SCHMIDT 1939

Eirenis rothi JAN 1863
Lytorhynchus diadema
(DUMÉRIL, BIBRON & DUMÉRIL 1854)
Malpolon moilensis (REUSS 1834)
Malpolon monspessulanus (HERMANN 1804)
(Fig. 20)
Natrix tessellata (LAURENTI 1768) (Fig. 21)
Psammophis schokari (FORSKÅL 1775)
Rhynchocalamus melanocephalus (JAN 1862)
Spalerosophis diadema (SCHLEGEL 1837)
(Fig. 22)
Telescopus dhara (FORSKÅL 1775) (Fig. 23)
Telescopus hoogstraali
SCHMIDT & MARX 1956
Telescopus nigriceps (AHL 1924) (Fig. 24)

Atractaspididae

Two species of the Atractaspididae occur in Jordan, as both are rather peculiar, they are discussed separately.

Atractaspis engaddensis HAAS 1950 (Fig. 25)

In Jordan, *A. engaddensis* has been reported for the first time in 1995. It is scarcely collected within the Afrotropical ecozone, penetrating through deep wadis into the surrounding habitats. Until now, it is reported from Al Ayna, Al La'ban area, Wadi al Arabah, and Wadi al Mawjib (AL-ORAN & AMR 1995, DISI et al. 2001). Due to its fossorial habits, it is only rarely encountered, although locally probably rather common. *A. engadensis* is a venomous snake with solenoglyph dentition and a potent toxin.

Micrelaps muelleri BOETTGER 1880

M. muelleri is a Levantine endemic species, having been reported only from Syria, Lebanon, Israel and Jordan. In Jordan, this enigmatic secretive snake has been reported only from the extreme northwestern part of the country, its occurrence is confined to a few localities in the Mediterranean ecozone only (AMR et al. 1997).

Elapidae

Walterinnesia aegyptia LATASTE 1887

The only elapid snake in Jordan, occurring in dry, stony wadis with scarce vegetation, desert and semidesert habitats except

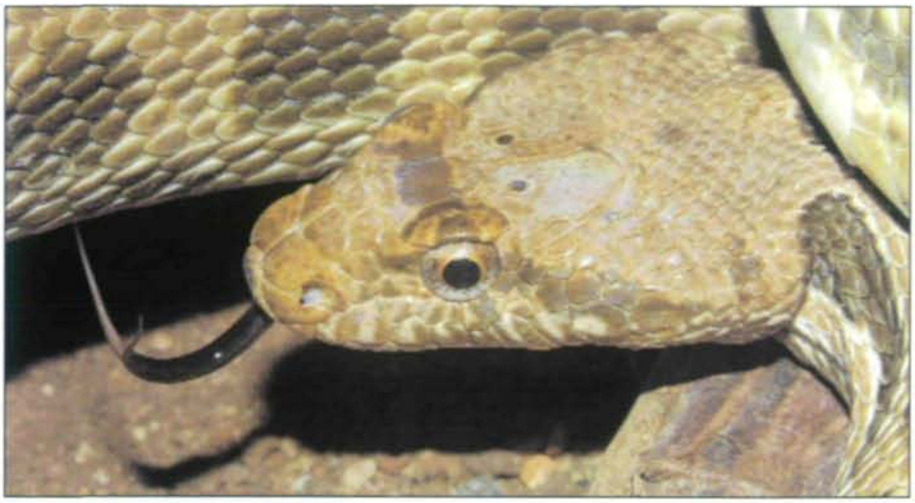

Fig. 22: *Spalerosophis diadema* is a common, mostly nocturnal colubrid species from arid and semiarid habitats. Ramtha (Photo: L. RIFAI).

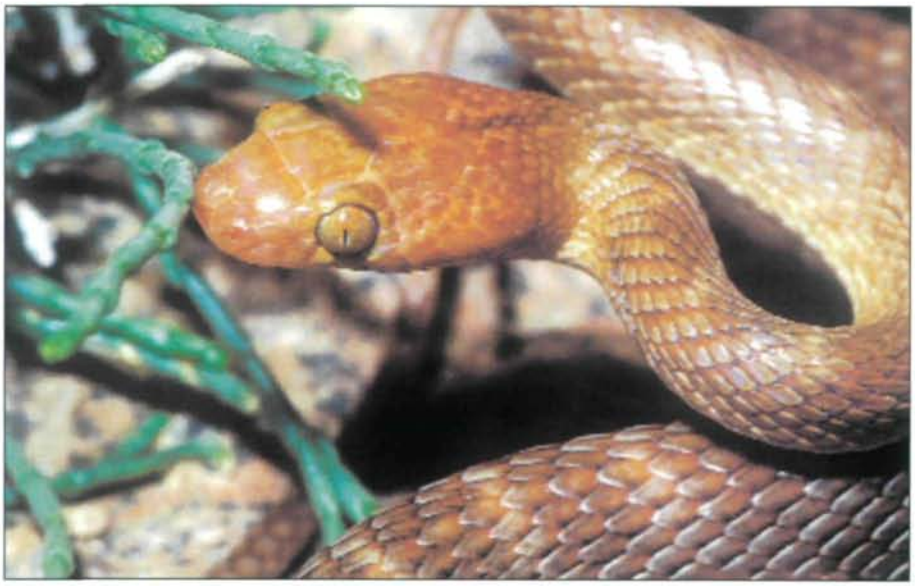

Fig. 23: *Telescopus dhara* is a nocturnal colubrid snake inhabiting the desert habitats of S Jordan. Wadi Ramm (Photo: D. MODRÝ).

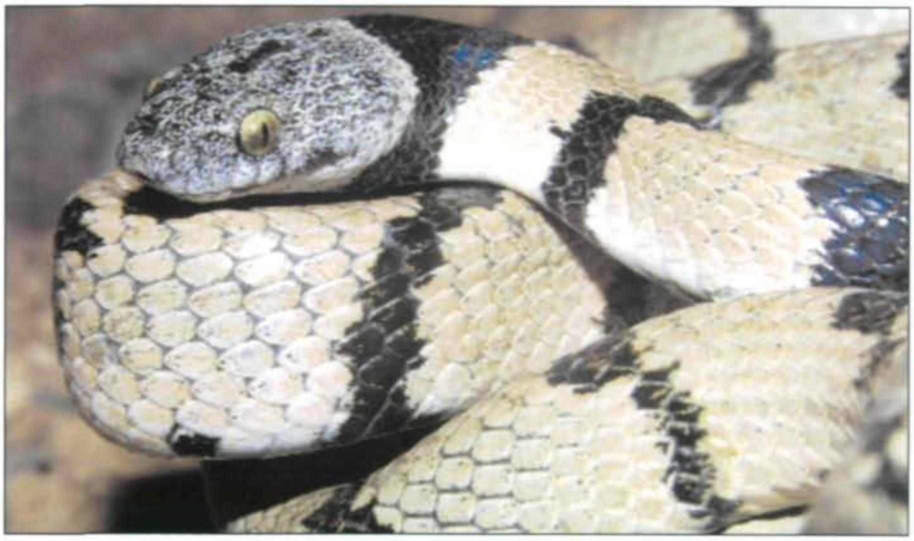

Fig. 24 : *Telescopus nigriceps*, a nocturnal colubrid with opistoglyph dentition, ranging in W Jordan in drier Mediterranean and Irano-Turanian habitats (Photo: L. RIFAI).

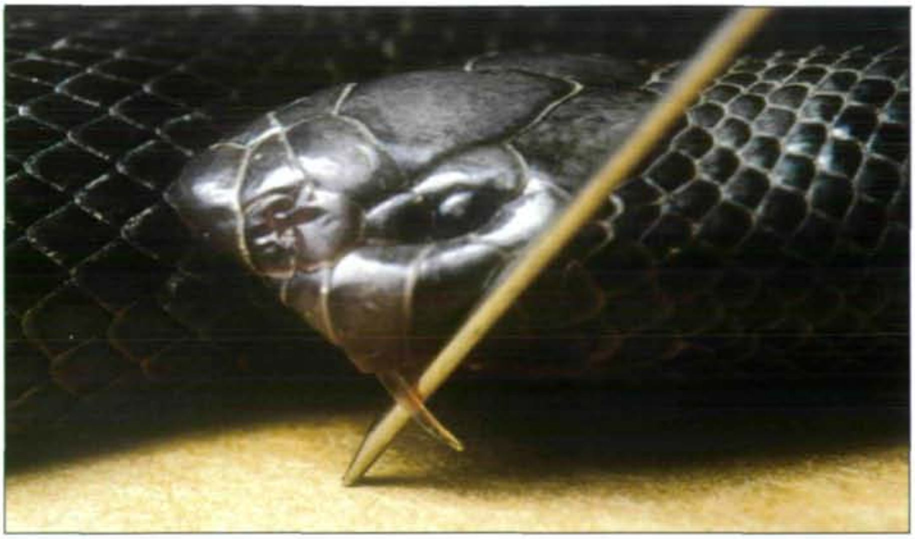

Fig. 25: *Atractaspis engadensis* is a species of Afrotropical origin, penetrating to Jordan through Wadi al Arabah and its tributary wadis. It is purely nocturnal, burrowing secretive snake species that is only rarely encountered. It is a highly venomous snake with rather peculiar solenoglyph dentition (Photo: D. MODRÝ).

of sandy areas, often near water sources. Although the bites are very rare, this snake is highly poisonous.

Viperidae

In Jordan, viperid snakes inhabit virtually all ecozones, individual species being associated with a particular type of habitat. Mediterranean forests and agricultural fields in the northwest are inhabited by *Vipera palaestinae*, the snake of highest medical importance in Jordan (AMR et al. 1994). *Echis coloratus* is typical for arid rocky areas in the south, but penetrates deeply into the north through Wadi al Arabah, the Jordan Valley and associated wadis. *Cerastes gasperettii* is a typical psammophil species distributed in all areas with extensive complexes of sand dunes (Fig. 26), while *Pseudocerastes persicus* inhabits dry habitats with hard substrates within the Eastern desert. *Macrovipera lebetina* is probably a relict species, known so far only from a few scattered localities south of At Tafillah (AL-ORAN et al. 1998). As there are only three specimens of this snake known from Jordan, it can be considered as the rarest of the Jordanian reptiles.

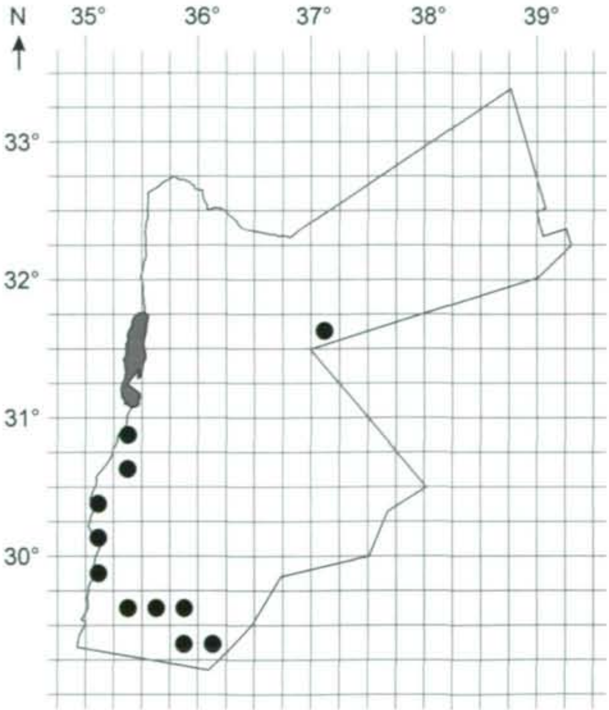

Fig. 26: Distribution of *Cerastes gasperettii* also reflects the distribution of sand dunes in Jordan. Its range is divided into two parts, completely separated by mountains east of Wadi al Arabah. Both enclaves are considered as distinct subspecies. Some other reptilian species have similar pattern of distribution, i.a. the agamid *Trapelus pallidus*. Its population in Wadi al Arabah is referred to as nominotypic race, while the animals from central and eastern Jordan belong to *T.p. agnetae*.

Species in Jordan:

Cerastes gasperettii LEVITON & ANDERSON 1967 (Fig. 27)
Echis coloratus GÜNTHER 1878
Macrovipera lebetina (LINNAEUS 1758)
Pseudocerastes persicus (DUMÉRIL, BIBRON & DUMÉRIL 1854) (Fig. 28)
Vipera palaestinae WERNER 1938 (Fig. 29)

Bataguridae

Mauremys rivulata (VALENCIENNES 1833)

The distribution of *Mauremys rivulata* in Jordan is limited by the presence of permanent water sources. It occurs in the valleys of Jordan and Yarmuk rivers, it has been reported from Al Hammah (Birket el Ara'is), Al'al, Ziqlab Dam, King Talal Dam and from some farms along the Jordan River (DISI 1998). It is an ecologically flexible species, inhabiting standing and slow flowing perennial waters, both natural and man-made.

Testudinidae

Testudo graeca LINNAEUS 1758 (Fig. 30)

T. graeca occurs in many localities of West Jordan. It is typically a Mediterranean species, inhabiting humid and mesic steppe, semi-steppe and forest habitats, including agriculturally used land.

Cheloniidae and Dermochelyidae

The Aqabah bay represents a habitat for four sea turtle species that are occasionally observed nearby the seashore or stranded on the shore (DISI 1998). The only species commonly observed is *E. imbricata*. As there are no nesting beaches in the Aqabah bay, all sea turtles from the region have to migrate to distant nesting sites.

Species in Jordan:

Caretta caretta (LINNAEUS 1758)
Chelonia mydas (LINNAEUS 1758)
Eretmochelys imbricata (LINNAEUS 1766)
Dermochelys coriacea (VANDELLI 1761)

Zusammenfassung

Amphibien und Reptilien des Haschemitischen Königreichs Jordanien. Jordanien hat eine sehr diverse Morphologie, welche sich in der Vielfalt der Herpetofauna wiederspiegelt. Insgesamt sind 90 Amphibien- und Reptilienarten von Jordanien bekannt. Von diesen sind drei Amphibien, mit einer wahrscheinlich schon ausgestorbenen vierten Art, 47 Arten sind Eidechsen, 35 Schlangenarten und fünf Schildkrötenarten. Die Amphibien sind in drei Familien vertreten, Eidechsen sowohl als auch Schlangen in sieben Familien und Schildkröten in vier. Die Verbreitung, Ökologie und die Systematik für die meisten Arten ist hier angegeben.

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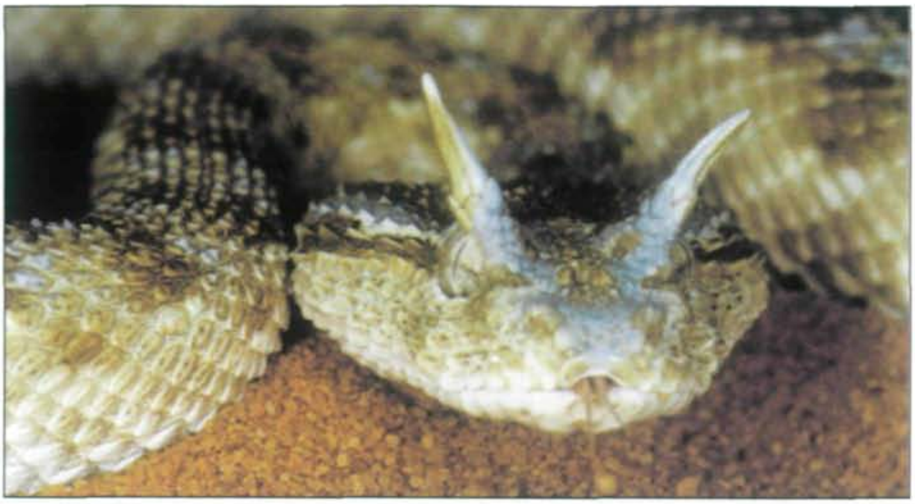

Fig. 27: *Cerastes gasperettii* is a psammophilous snake species that inhabits sand dune systems of S and E Jordan. Typically, horned and hornless specimens co-occur within the same population. Abar al Hazim (Photo: D. MODRÝ).

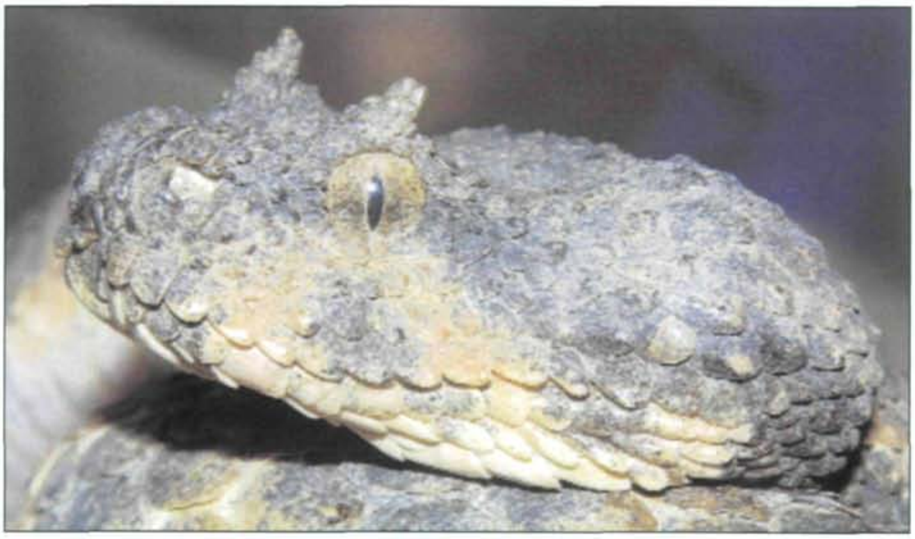

Fig. 28: Head of *Pseudocerastes persicus fieldi*, a large viperid from semideserts and deserts of interior Jordan. The projections above the eyes consist of several smaller scales, which is a feature to easily distinguish it from another horned species –*Cerastes gasperettii*. Safawi (Photo: L. RIFAI).

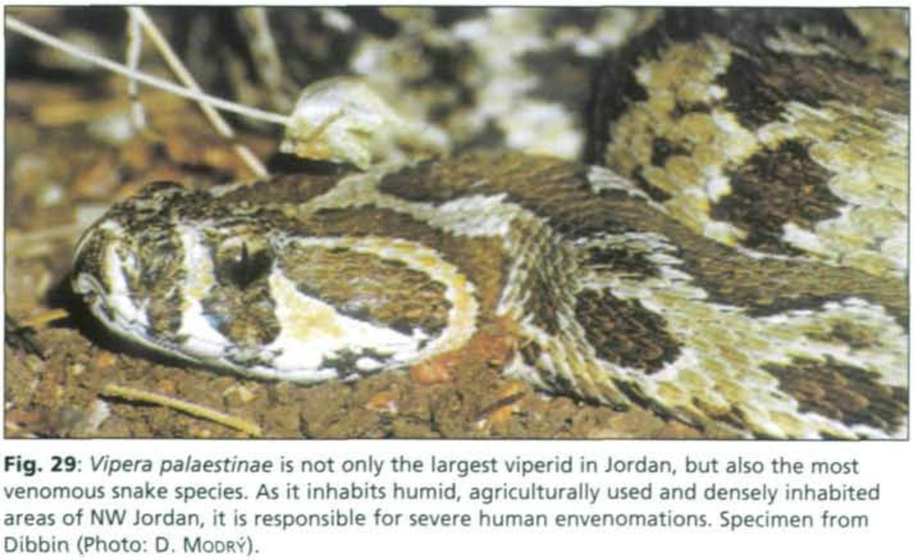

Fig. 29: *Vipera palaestinae* is not only the largest viperid in Jordan, but also the most venomous snake species. As it inhabits humid, agriculturally used and densely inhabited areas of NW Jordan, it is responsible for severe human envenomations. Specimen from Dibbin (Photo: D. MODRÝ).

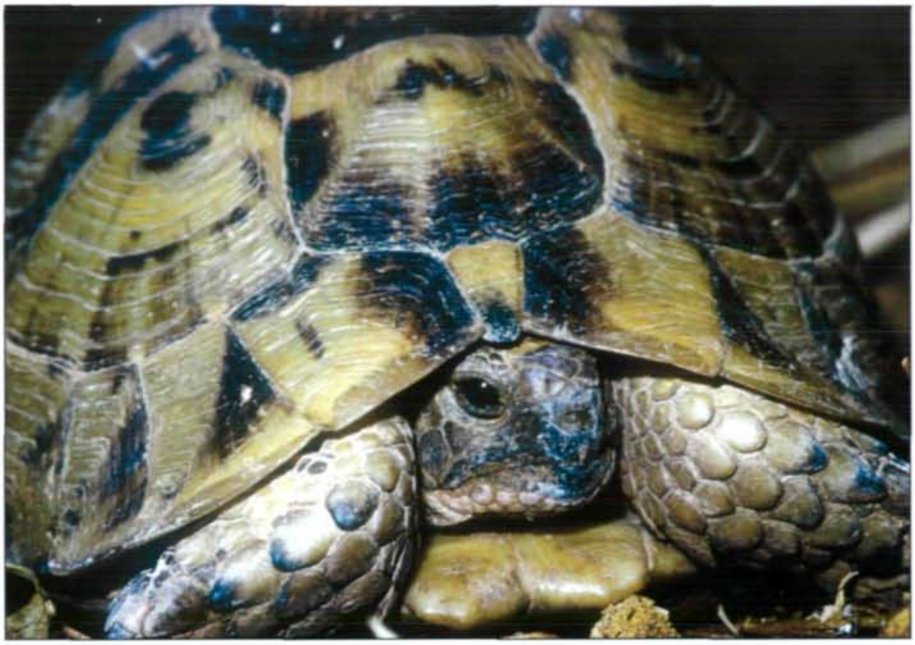

Fig. 30: *Testudo graeca* is widely distributed in Mediterranean habitats of western Jordan. Jarash (Photo: D. Modrý).

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